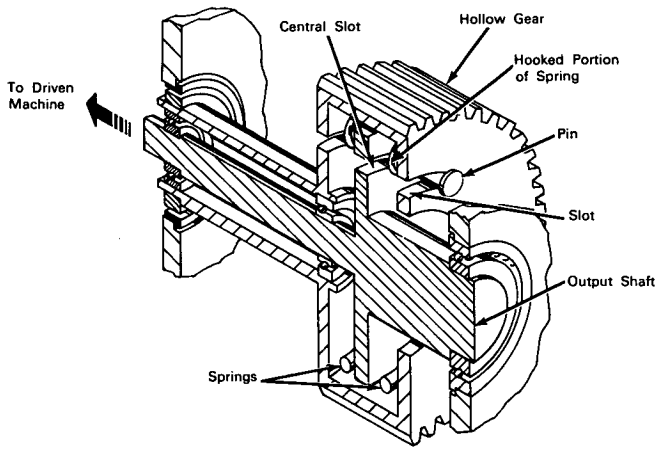
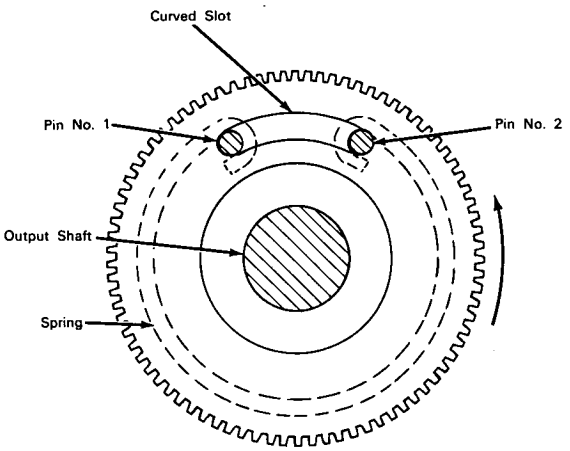
NASA TECH BRIEF

Shock Absorber Protects Motive Components Against Overloads





SECTION THROUGH HOLLOW GEAR UNDER NORMAL TORQUE

The problem: Protecting motors and gear trains from possible damage by high starting loads or sudden stoppages of rotating machinery. A shock absorber specified for this purpose must be simple, rugged, durable, and unaffected by lubricants and temperature variations. It must also be equally effective in both directions of rotation and have negligible backlash. Conventional frictional devices such as slip clutches may not meet these requirements, and can also cause loss of gear indexing.

The solution: A device which includes an output shaft, a hollow gear around this shaft, and a pair of springs which form a resilient driving connection between the shaft and gear. The springs are preloaded to match the maximum input torque to the device during normal operation of the rotating machinery. The device therefore comes into service only when abnormally high torques are applied.

How it's done: In operation of the device, the hollow gear is driven by a mating gear (not shown) connected to a prime mover, and the left end of the output shaft is connected to a load, such as a pump, compressor, or other rotating machinery. Under normal torques, Pin No. 1, or No. 2 depending on the direction of rotation, is held against the ends of the curved slots in the hollow gear by the hooked ends of the springs. The pin will therefore bear against the end of the central slot in the output shaft which will rotate together with the hollow gear. When the load becomes excessive and slows or stops the output shaft, the spring connection permits relative motion between the hollow gear and output shaft. The amount of spring deflection possible, and thus the amount of rotation of the hollow gear relative to the shaft, is limited to the distance between the hook portions on the ends of each spring. This device therefore permits the gear

(continued overleaf)

train to be brought to a cushioned stop rather than a sudden stop that would generate high impact or shock loads that would damage components. After the hollow gear and other components of the gear train have been stopped, and the cause of the stoppage is eliminated, the action of the springs will return the components of the gear train to their original position without loss of indexing.

Notes:

1. This device may be of value in earth-moving machinery, machine tools, servo systems, radar trackers, and various other rotating mechanisms subject to sudden overloads.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Western Operations Office
   150 Pico Boulevard
   Santa Monica, California, 90406
   Reference: B65-10008

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: Douglas Aircraft Company
under contract to Western Operations Office
(WOO-092)